

Local Curriculum Guide				Quarter: 1st 9 Weeks Number of Days: 8		
Course Name: (H) Physics		SAMPLE / PRACTICE SPREADSHEET				
Unit Title: Scientific Reasoning						
		Instructional Learning Plan				
Standards	Student Friendly Objectives	Assessment/Evidence of Proficiency	Instructional Strategies	Materials/Resources	Essential Vocabulary	Informational skills integration (technology)
Phy.1.1.1	Making Measurements Analyzing Graphs		Bouncy Ball Lab. Students will use various balls, bouncy, tennis, golf, ping-pong, etc to determine a lab procedure that would quantitatively compare their drop height to resulting bounce height. The teacher will use guided inquiry to help students take multiple trials, test multiple heights, and appropriately graph the data. Students will use their graphs and a linear regression to predict the required drop height when given a desired bounce height. (Approximate time = 75 min)	bouncy balls, tennis balls, golf balls, ping-pong ball, meter sticks	Slope Y-Intercept	HS.SI.1 - Watch commercial about SkyBall's bouncing claims and comparison to other balls. Establish motivation for company's commercial and align the lab to test whether their claims are correct.
	Conversions		Rubber Band Hockey Puck Lab. Students will use a low-friction channel and a rubber band to sling shot a Petri-dish hockey puck (with variable mass) a resulting distance. Students will be encouraged to come up with measurable variables they can alter in a controlled manner. Two such examples include the pullback length of rubberband and the mass of the hockey puck. Students will design an experiment and analysis method that will determine the affect these variables have on the distance the hockey puck travels. Students will graph their data and analyze quadratic and inverse relationships. Students will write a full lab report using one independent variable. (Approximate time = 90 min)	petri dish (hockey puck), rubber bands, various masses, meter stick	Best Fit Line Linear Inverse Parabolic Linearize Tangent Line	1a 1c 3a 3c

Local Curriculum Guide				Quarter: 1st 9 Weeks Number of Days: 8		
Course Name: (H) Physics		SAMPLE / PRACTICE SPREADSHEET				
Unit Title: Kinematics in One-Dimension						
			Instructional Learning Plan			
Standards	Student Friendly Objectives	Assessment/Evidence of Proficiency	Instructional Strategies	Materials/Resources	Essential Vocabulary	Informational skills integration (technology)
Phy.1.1.1	Frame of Reference		Battery-Powered Vehicle Lab. Students will be given constant velocity carts and prompted to devise an experiment and record the appropriate data that will allow them to predict the amount of time it would take the cart to travel a given distance. In this guided-inquiry lab, students will take distance and time data for the cart, graph the data, and determine that the relationship between these variables is speed. Students will also compare position and time data for a cart moving in the opposite direction to introduce the concept of velocity.	battery-powered cars, meter sticks, timers, graph paper	Position	HS.TT.1 - Students will have used LoggerPro and other technological devices to solve problems and complete mathematical fits by now. When completing lab practicums at the end of each unit (see final lab) they will evaluate and decide which technology tools (probeware, LoggerPro, Excel, Word, Websites, etc) will help solve the puzzle.
Phy.1.1.2	Measuring Distance and Displacement		(Approximate time = 75 min)		Distance	
	Calculate Speed and Velocity				Displacement	
	Calculate Acceleration		Graphs of Motion with Pulleys and Weights. Students will use a low-friction track, carts, motion sensors, and a pulley and weight system to create position vs time graphs, velocity vs time graphs, and acceleration vs. time graphs for constantly accelerating objects. Students will devise a procedure that allows them to determine the affect controllable variables have on the motion of the cart, including system-mass, cart-mass, and ramp-angle. Students will also compare the motion of a rolling cart to the motion of a constant velocity cart to introduce the concept of a tangent line. Students will write a full lab report using one independent variable.	pulleys, weights, low-friction, carts, motion sensors, ramp	Speed	
			(Approximate time = 90 min)		Velocity	
					Acceleration	
			Uniform Motion Lab. Students are given a cart, motion detector, and a track in this guided-inquiry lab. Students are challenged to use their track and the cart to allow the cart to move a constant velocity. Students should find that if the track is flat, the cart decelerates and they are required to give the track a slight incline to achieve this task. The teacher should use a class discussion to have students explain why they needed to raise their track and help students to explain they needed to raise the track to overcome friction.	motion detector, cart, track	Vector	
			(Approximate time = 45 min)		Scalar	
					Slope	
					Rate	
					Tangent Line	
					Kinematics	

Local Curriculum Guide				Quarter: 1st 9 Weeks Number of Days: 10		
Course Name: (H) Physics Unit Title: Newton's Laws and Vectors		SAMPLE / PRACTICE SPREADSHEET				
			Instructional Learning Plan			
Standards	Student Friendly Objectives	Assessment/Evidence of Proficiency	Instructional Strategies	Materials/Resources	Essential Vocabulary	Informational skills integration (technology)
Phy.1.2.1	Balanced Forces				Force	HS.TT.1 - When completing lab practicums at the end of each unit (see final lab) they will evaluate and decide which technology tools (probeware, LoggerPro, Excel, Word, Websites, etc) will help solve the puzzle.
Phy.1.2.2	Newton's First Law of Motion		Dry Ice Motion Lab. Students will demonstrate Newton's First Law using the motion of dry ice over a tabletop. Students will investigate the motion of a piece of dry ice that is sitting on the tabletop, without any forces. Then students will investigate the motion of a piece of dry ice that has been given an initial force in some direction.	dry ice or wet ice	Inertia	
Phy.1.2.3	Unbalanced Forces		(Approximate time = 20 min)		Static Equilibrium	
Phy.1.2.4	Gravity				Gravity	
	Representing Forces		Gravitational Force Lab. Students will use two different methods (motion sensors and timing gates) to determine the acceleration due to gravity of a variety of objects. Students will devise a procedure that will allow them to determine acceleration using these tools. The teacher should urge students to try objects of different sizes and masses to help students understand that the acceleration due to gravity is constant. Students will then use force sensors and masses to determine the force of gravity on the same set of objects. Students will then use graph the data to determine that the force of gravity and the mass of an object are proportional to each other and related to the acceleration due to gravity they previously determined. Students will write a full lab report.	force sensors or spring scales, various masses	Free Body Diagrams	
	Newton's Second Law of Motion		(Approximate time = 60 min)		Vector Components	
	Newton's Third Law of Motion				Normal Force	
			Pull Harder, More Force Lab. Students will be given a pair of spring scales or force sensors and challenged to pull with one. Students should take measurements from both sensors and represent their data in some way. Students should eventually recognize that both sensors of spring scales always read the same value and Newton's 3rd Law is introduced.	spring scales or force sensors	Mass	
			(Approximate time = 20 min)		Friction	
					Weight	
					Balanced Forces	
					Unbalanced Forces	
					Net Force	
					Static Friction	
					Kinetic Friction	
					Tension	

Local Curriculum Guide				Quarter: 1st 9 Weeks Number of Days: 10		
Course Name: (H) Physics Unit Title: Newton's Laws and Vectors		SAMPLE / PRACTICE SPREADSHEET				
			Instructional Learning Plan			
Standards	Student Friendly Objectives	Assessment/Evidence of Proficiency	Instructional Strategies	Materials/Resources	Essential Vocabulary	Informational skills integration (technology)
Phy.1.1.3	Projectile Motion		Controlling Projectile Motion Lab. This is an inquiry-based lab in which students collect and graph trajectory data. A variety of launch ramps, boards, paper, and carbon paper are provided. Students must figure out how to get trajectory data, and then must then use the data to determine what factors influence the projectile motion of objects. Students will be asked to devise a method will allow them to determine the initial velocity of the object. Students will write a full lab report.	launch ramps, boards, paper, carbon paper	Projectile	HS.SI.1 - Using Video Analysis software, students will determine whether the "red bird" in Angry Bird follows Newton's Laws. Students can determine length of flight, fall time, etc based on their data.
Phy.1.2.5	Circular Motion		(Approximate time = 60 min)		Trajectory Component Vectors	HS.TT.1 - When completing lab practicums at the end of each unit (see final lab) they will evaluate and decide which technology tools (probeware, LoggerPro, Excel, Word, Websites, etc) will help solve the puzzle.
	Centripetal Force					
			Video Analysis of Projectile Motion Lab. Students will choose one of their objects from the previous lab and complete a setup that will allow them to videotape the trajectory of the object. Help students realize they need to include a measuring device as a reference. The class will work through the video analysis portion of LoggerPro and quantitatively describe the motion of the object.	LoggerPro, objects to traject	Orbit	4d
			(Approximate time = 60 min)		Angular Acceleration	1a
					Trigonometric Relation	1c
			Rotating Tire Lab. The teacher demonstrates a rotating tire to students. The class should discuss what measurements could be made about the rotating tire. Students should hopefully realize that the tire is rotating with a changing angle with increasing time. By marking an initial point and recording the tire rotating students can measure the angle. Students should graph this data with respect to time. Ask students how they could produce a velocity vs time graph and students should remember that finding the slope of tangent lines will give them velocity. As a class, an extension can be made to determine the angular acceleration using a photogate. By varying parameters the class can determine the meaning of torque.	tire, photogate	Radius	3a
			(Approximate time = 75 min)			3b
						3c

Local Curriculum Guide				Quarter: 1st 9 Weeks Number of Days: 6		
Course Name: (H) Physics		SAMPLE / PRACTICE SPREADSHEET				
Unit Title: Work, Energy, Power						
		Instructional Learning Plan				
Standards	Student Friendly Objectives	Assessment/Evidence of Proficiency	Instructional Strategies	Materials/Resources	Essential Vocabulary	Informational skills integration (technology)
Phy.2.1.1	Conservation of Energy		Energy Transfer Lab. Students will use a rubber band or spring and a motion cart to investigate transfer of energy. The teacher should demonstrate the motion that occurs when the spring is stretched or condensed and ask students what factors in the motion can be measured. Students should prepare a procedure that will let them to determine the relationship between these factors. Students will need to determine the spring constant in order to determine the relationship between velocity and kinetic energy.	rubber band or spring, motion cart	Potential Energy	HS:RP.1, HE.SE.1 - Students will complete a project about the energy crisis and create a media based presentation highlighting and offering solutions to this problem.
Phy.2.1.2	Potential Energy		(Approximate time = 60 min)		Kinetic Energy	HS.TT.1 - When completing lab practicums at the end of each unit (see final lab) they will evaluate and decide which technology tools (probeware, LoggerPro, Excel, Word, Websites, etc) will help solve the puzzle.
Phy.2.1.3	Kinetic Energy				Conservative Forces	
	Work				Non-Conservative Forces	
	Power				Pendulum	
					Work	
					Power	
					Energy Transfer	
					Mechanical Energy	

Local Curriculum Guide				Quarter: 1st 9 Weeks Number of Days: 6		
Course Name: (H) Physics		SAMPLE / PRACTICE SPREADSHEET				
Unit Title: Systems of Particles & Linear Momentum						
			Instructional Learning Plan			
Standards	Student Friendly Objectives	Assessment/Evidence of Proficiency	Instructional Strategies	Materials/Resources	Essential Vocabulary	Informational skills integration (technology)
Phy.1.3.1	Collisions		Cart Collisions Lab. Teacher will demonstrate the use of dynamics cart, force sensors, and photogates to analyze the motion of colliding objects. Students will be asked to determine if a relationship exists between Force and time in a collision. By graphing their data students will be able to calculate impulse and the change in momentum. After discussion, students will be given the task to determine the unknown mass of a cart. Students will write a full lab report.	force sensors, carts, photogates	Elastic Collision	HS.SI.1 - Using Video Analysis software, students will determine whether the "blue bird" and "white bird" in Angry Bird follows Newton's Laws and laws about momentum. Students can determine length of flight, fall time, change in velocity, change in momentum, etc
Phy.1.3.2	Conservation of Momentum		(Approximate time = 60 min)		Inelastic Collision	HS.TT.1 - When completing lab practicums at the end of each unit (see final lab) they will evaluate and decide which technology tools (probeware, LoggerPro, Excel, Word, Websites, etc) will help solve the puzzle.
	Conservation of Energy				Impulse	
	Impulse				Impulse-Momentum Theorem	
					Center of Mass	
					Momentum	

Local Curriculum Guide				Quarter: 1st 9 Weeks Number of Days: 8			
Course Name: (H) Physics		SAMPLE / PRACTICE SPREADSHEET					
Unit Title: Electrostatics, Charge Behavior and Interactions							
			Instructional Learning Plan				
Standards	Student Friendly Objectives	Assessment/Evidence of Proficiency	Instructional Strategies	Materials/Resources	Essential Vocabulary	Informational skills integration (technology)	
Phy.3.1.1	Electrical Charges		Sticky Tape Lab. Students will use sticky-tape, aluminum foil, paper, plastic rods, and other materials to establish the three electrical charges in this guided-inquiry lab. Students will use the plastic rod convention to establish and label charges. Discussion helps students understand electrons are moving and how attraction occurs between a charged object and a neutral object.	sticky-tape, aluminum foil, paper, plastic rods	Charge	4a	
Phy.3.1.2	Electric Fields		(Approximate time = 30 min)		Electric Field	HS.TT.1 - When completing lab practicums at the end of each unit (see final lab) they will evaluate and decide which technology tools (probeware, LoggerPro, Excel, Word, Websites, etc) will help solve the puzzle.	
Phy.3.1.3	Coulomb's Law				Coulomb's Law		
Phy.3.1.4			Repulsive Balloon Lab. Students will be shown that a charged balloon will attract a pith ball. Then show them that after the balloon touches the pith ball the two objects repel. Demonstrate that the proximity of the balloon determines how far the pith ball moves. Ask students to determine whether there is a quantitative relationship. Students should develop a procedure to quantitatively take distance to pith and resulting repulsion. Methods could include using reflections to draw positions or video analysis to record distances. Students should graph the data and will discover that repulsion distance (related to force) is proportional to $1/r^2$. Students will write a full lab report.	balloons, pith ball	Conduction		
Phy.3.1.5			(Approximate time = 60 min)		Induction		
					Static Friction	1c	
			Mapping Electric Fields Lab. Students will use conductive paper, a multi-meter, and a power source to map the electric field and equipotential lines across the paper.	conductive paper, multi-meter, power source	Electric Potential	3a	
			(Approximate time = 60 min)		Electric Force	3b	
					Voltage	3c	
					Right-Hand Rule		

Local Curriculum Guide				Quarter: 1st 9 Weeks Number of Days: 10		
Course Name: (H) Physics		SAMPLE / PRACTICE SPREADSHEET				
Unit Title: Electrical Circuits						
		Instructional Learning Plan				
Standards	Student Friendly Objectives	Assessment/Evidence of Proficiency	Instructional Strategies	Materials/Resources	Essential Vocabulary	Informational skills integration (technology)
Phy.2.3.1 Phy.2.3.2 Phy.2.3.3	Electric Circuit Ohm's Law Series Circuit		Creating Light Lab. Students are given various light bulbs, switches, batteries and wires and instructed to find orientations that will turn on the lights and use the switches. Class discussion following the lab should emphasize closed vs open circuits. (Approximate time = 25 min)	light bulbs, switches, batteries, wires	Conductor Insulator AC v DC	HS.TT.1 - When completing lab practicums at the end of each unit (see final lab) they will evaluate and decide which technology tools (probeware, LoggerPro, Excel, Word, Websites, etc) will help solve the puzzle.
Phy.2.3.4 Phy.2.3.5	Parallel Circuit		Ohm's Law Lab. In this guided-inquiry lab students are prompted to determine the voltage of a battery set based on resistance and current readings. Students are provided with various resistors and an ammeter or multimeter to measure current. Students should devise a method to obtain data points and graph their data. Students will find a linear fit to determine the voltage of the battery. Students will write a full lab report. (Approximate time = 45 min)	ammeter or multimeter, resistors	Resistors Current Power	
			Brightest Bulbs Lab. In this lab students will be given the task of creating the brightest circuit using 4 light bulbs. Students will be given identical light bulbs and a power supply. Students will be asked to design a circuit and record relevant currents throughout their circuits. Students should draw representations of successful and failed attempts at getting the brightest lights. (Approximate time = 30 min)	4 light bulbs, circuits	Series Circuit Parallel Circuit Ohm's Law Combination Circuit Voltage	3a 3b 3c

Local Curriculum Guide				Quarter: 1st 9 Weeks Number of Days: 8		
Course Name: (H) Physics		SAMPLE / PRACTICE SPREADSHEET				
Unit Title: Magnetism						
		Instructional Learning Plan				
Standards	Student Friendly Objectives	Assessment/Evidence of Proficiency	Instructional Strategies	Materials/Resources	Essential Vocabulary	Informational skills integration (technology)
Phy.3.2.1	Magnets		Fields and Permanent Magnet Lab. Students will use a similar procedure to the previous lab to determine the shape of the magnetic field around variously shaped permanent magnets. (Approximate time = 30 min)	compass, magnets, paper	Magnet	HS.TT.1 - When completing lab practicums at the end of each unit (see final lab) they will evaluate and decide which technology tools (probeware, LoggerPro, Excel, Word, Websites, etc) will help solve the puzzle.
Phy.3.2.2	Magnetic Fields				Magnetic Field	
Phy.3.2.3	Electromagnetism				Magnetic Pole	
			Creating an Electromagnet Lab. Students will be given a battery, wire, nails, and paperclips and prompted to create a magnet. Once successful, students should be prompted to determine what factors affect the strength of the magnet. Students can graph the data to show their relationships.	battery, wire, nails, paperclips, magnet	Electromagnetic Induction	
					Faraday's Law	
			Colors of Light. Students will use spectrosopes to investigate the electromagnetic spectrum. Students will see white light split into the rainbow and compare this with other light sources. Other light sources include fluoresent light, candlelight, and lasers (on the wall). (Approximate time = 20 min)		Mechanical Energy	
					Electrical Energy	3a
					Transformer	3b
						3c

Local Curriculum Guide				Quarter: 1st 9 Weeks Number of Days: 12	extra 4 days for Review/Final	
Course Name: (H) Physics		SAMPLE / PRACTICE SPREADSHEET				
Unit Title: Waves						
		Instructional Learning Plan				
Standards	Student Friendly Objectives	Assessment/Evidence of Proficiency	Instructional Strategies	Materials/Resources	Essential Vocabulary	Informational skills integration (technology)
Phy.2.2.1	Waves		Pendulum Lab. In this guided-inquiry lab the teacher will show students a simple pendulum and ask them to describe the motion. Students should see that the pendulum stays in motion for sometime, and has constant point it returns to. Describe this as the period and ask students to determine what factors control the period. Students may determine they should test multiple variables including mass, amplitude, and length. Students should graph these relationships and determine the factors that contributed to the period. After this has been discussed, challenge students to determine the acceleration due to gravity using the pendulum. Students will write a full lab report.	pendulum	Wave	HS.TT.1 - When completing lab practicums at the end of each unit (see final lab) they will evaluate and decide which technology tools (probeware, LoggerPro, Excel, Word, Websites, etc) will help solve the puzzle.
Phy.2.2.2	Sound Waves		(Approximate time = 60 min)		Wavelength	
Phy.2.2.3	Light Waves				Period	
			Slinky Lab. Students will use slinkies to investigate the shape and behavior or transverse and longitudinal waves. They will also demonstrate open and fixed end reflection.	slinkies	Frequency	
			(Approximate time = 20 min)		Amplitude	
					Crest	
			Record My Voice Lab. Students will use a microphone and data acquisition software to record voices and sounds. Students will use the Fourier transforms produce "voice-prints" of the sounds. Students will analyze the resulting graphs to determine the role the amplitude, frequency, beat, and vibrator have on the sound.	imovie or microphone	Trough	
			(Approximate time = 60 min)		Wave Speed	
					Spring	
			Reflection in a Plane Mirror Lab. Using plane mirrors the teacher will demonstrate light from a small laser pointer bouncing around the room. Students are asked to determine what will change the location of the light. Once determining that the position and angle of the mirror (incident) will change the location of the reflection angle, ask students to take quantitative data comparing these two angles. Students will determine the Law of Reflection. Once completed demonstrate how an image can be reproduced using the flat mirror and a light source. Give students a concave mirror and ask them to produce a focused image of the reflection. Students will write a full lab report.	plane mirrors, laser pointer, flat mirror, concave mirror	Mechanical Wave	
			(Approximate time = 75 min)		Medium	
					Sound	
					Doppler Effect	
					Electromagnetic Wave	
					Refraction	
					Reflection	
					Vacuum	
					Superposition	
					Interference	
					Longitudinal Waves	
					Transverse Waves	
					Surface Waves	
					Compressional Wave	